VIRGINIA WILDLIFE

JUNE 1986 ONE DOLLAR

"I believe our first attention now should be to providing food and cover for our wildlife. Civilized man steadily encroaches upon the natural habitat of game and as he clears the forest and intensively cultivates the fields, unless a certain part of his domain is left as nature made it, wild life must suffer . . . How many of you are planting mulberry, wild cherry, wild grapes and seed bearing bushes—natural food for birds?"

This admonishment was written in 1922, ten years before Aldo Leopold published his treatise on the science of game management, 14 years before Ducks Unlimited was organized, 15 years before the birth of the National Wildlife Federation, and more than 20 years before the creation of either of Virginia's national forests.

These words were written by M. D. Hart, the Secretary of the Virginia Department of Game and Inland Fisheries, in a bulletin that sold for 10¢ a copy and turned into *Virginia Wildlife* a few years later.

The Game Commission was only six years old at the time that Hart was writing. From the moment it was created in the Senate cloakroom of the General Assembly, it was on its own. The Department of Game and Inland Fisheries, as it was called, was to operate solely out of funds generated by hunting and fishing licenses (which were nonexistent at the time) to protect, propagate and preserve the wild animals and birds of the state and the fish of its waters.

But the Department of Game and Inland Fisheries didn't know much more than the layman about managing fish and wildlife. Heck, we were looking at ways to manage wildlife without studies, without principles, without research, *without anything* to base rational decisions on—except the personal observations and opinions of people.

Since we had no tools, we went about inventing them. And in the beginning, we flat out failed. We tried to stock elk and pheasants, and even some Mexican quail. Sponsored a hawk-killing contest that today would raise the hair on any conservationist's neck. But, we did it because *we didn't know any better*. The idea of eliminating predators to increase populations seemed to make good sense, and no scientific studies had been conducted to prove it false. In fact, most people during that time could list examples (and did) that in their minds proved the theory true.

But to look back to the yellow crinkled pages of those early bulletins is to find hope. Because among the full-page ads for hawk killing and varmint trapping are sharp outlines of understanding that only hindsight can pick out.

The bulletin published in November of 1920 carried a rebuttal to predator control by A. K. Fisher of the Department of Agriculture: "Students of natural history know full well that to secure reliable data they must devote much time to observations and study . . . Limited information, prejudice and vague circumstantial evidence have often brought certain groups of birds and mammals unjustly into ill-repute. This state of affairs is not due to the writings or teaching of naturalists, but to those who do not care for the truth, do not know how to interpret it, or are unwilling to go to the trouble of obtaining it."

The Game Commission painfully learned. And in the process, began to *see*. R. T. Corbell, Field Secretary for the Department of Game and Inland Fisheries wrote in April of 1921, "One of the most important problems today confronting conservationists in Virginia is the matter of pollution of the watercourses of the State by industrial plants located along their banks . . . And this pollution is growing apace, with a public apparently apathetic in checking its spread . . . The time to consider measures to prohibit all manner of pollution is now."

And Game Commissioner Bilisoly explained to the General Assembly in 1922: "When fish migrate, generally upstream in the spring, journey is often suddenly ended in many streams by dams built without regard to the life of the stream. No dam should be erected in a stream without an approved ladder or chute that will permit the passage of fish from level to level."

Finally, in 1937, Senator A. Willis Robertson took the knowledge and understanding he had gained as the first Commissioner of the Virginia Commission of Game and Inland Fisheries to Congress, and co-authored the single most important legislation ever enacted for the preservation of wildlife in the history of the United States—the Pittman-Robertson Act.

Digging back into 70 years of yellowed print can fire you up. You realize that great men with foresight like Senator Robertson were part of us. Part of our mistakes, and our struggle to see and understand. And it helps you realize that if you're *really* trying to figure something out, that somewhere in the midst of all those mistakes and well-meaning disasters there might emerge an idea that points in the right direction. It might not be realized right away, but it always hangs on. In looking back, you realize that the mistakes will be buried, but the truths will be repeated and remembered.

Wish us a happy birthday—along with the prayer that the next 70 years won't age us with dimmed memories and blurred vision. We need them too much.

Dedicated to the Conservation of Virginia's Wildlife and Related Natural Resources
Volume 46, Number 6 *June 1986*

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Chesapeake Bay sunset; photo by Bill Portlock, Bowling Green

Cracking The Osprey Mystery

Having solved the mystery of osprey decline in the 1970's, scientists are now puzzled by a new mystery in the recovered osprey populations of the Chesapeake Bay: Why are their chicks starving?

by Mitchell Byrd

"They will be here by the second week of March" said Mathews County waterman, Swanson Hudgins. "They will stay until at least early August when the first ones leave for South America. I know because I have been watching the fish hawk all of my life. It's a mighty noble bird."

Noble it is, and though mighty in the air, this bird of prey was almost snuffed out of existence by pesticide use in the United States. Today, the osprey is recovering and soaring once more in Virginia and throughout the Chesapeake Bay. Ironically, however, today the osprey is facing not extinction, but overpopulation. It is now reaching the limits of its environment, and suffering the consequences.

Although the Chesapeake Bay has long supported one of the largest osprey populations in the world, its history was never well documented. We do know, however, that ospreys began to

Osprey; photo by Steve Maslowski.

show reduction in numbers in some areas, notably southern California, as early as the turn of the century. In Britain, the species was declining before the decade beginning in 1900. Until 1955, other North American populations were either relatively stable or their decline had gone unnoticed. In 1955, however, osprey populations plummeted. Almost complete reproductive failure of ospreys was observed in the Connecticut River. It was estimated that ospreys were declining at an annual rate of 31 percent. Similar declines were noted on Long Island and in coastal New Jersey. What was happening? DDT. This pesticide, which was widely used after 1945, induces thin shells in osprey eggs, resulting in hatching failure.

By 1969, the College of William and Mary had started intensive studies of the osprey population in Virginia. To date, 3,500 osprey nestlings have been banded and individually marked with color bands, allowing us to identify them later as individuals. These studies that are continuing today as part of the Virginia Game Commission's Nongame Program, and the results have shed light on some of the mysteries of osprey behavior and biology.

Top: Six-week-old osprey in nest on channel marker. The traditional tree nests are a rarity today. Above: Seven-week-old osprey exercising its wings; photos by Mitchell Byrd.

We have found that ospreys begin to return to Virginia the first two weeks of March from wintering grounds in the West Indies and South America. Most birds have arrived back in the state by the latter part of March and begin their own spectacular brand of fishing in rivers. With aerial dives, they plunge into the water and snatch up live fish such as menhaden, sole and flounder.

Males usually arrive back in the area a few days before females, and quickly establish a nest site and territory, which is normally within 30 kilometers of where they were born. Birds will return to the same nest site year after year if it is intact. Breeding birds also seem to stay in the same river system, and if they make a nest change, it usually involves a shift to a nearby location.

It appears that ospreys make their first concerted effort to breed when they are about six years old. The male will initiate a courtship ritual with a spectacular aerial display involving a live fish offering to a prospective mate. Pair bonds are quickly established, and only two birds have been observed to change mates while both were still known to be alive (In both of these cases, the birds remained on the same river with new mates. In one case, the mate of one female disappeared for one year and reappeared the following year at the original nest site with a new, younger female).

Nest building normally takes up to two weeks to complete, and April 15 marks the peak of egg laying. Clutch sizes range from 1 to 4 eggs, and incubation takes about 37 days. By the time the osprey chicks are 7-8 weeks old, they begin to test their wings and make their first flights. Adults usually depart for the wintering areas the first of August, with the young following slightly later. However, only the adults will make the following spring return trip to Virginia. The young will return when they are three years old.

Having learned much through the studies about osprey populations in Virginia, it becomes clear that ospreys were still declining in the state as late as 1972. In 1973, the general use of DDT was banned in the country, and the response of ospreys, as well as other birds of prey, was both immediate and dramatic. By 1975, the Virginia population consisted of 500 breeding pairs which were producing an average of 1.0 young per active nest. Since then, the population has consistently maintained an annual productivity of 1.0 to 1.5 young per active nest.

As a result of this dramatic reversal in production, the number of breeding pairs of ospreys in Virginia has increased to over 800. Many areas such as lower Tidewater and the James River are being repopulated. In 1973, the James River had lost its ospreys, but by 1985, the river contained over 20 breeding pairs. Breeding pairs now occur on Kerr Reservoir and it is reasonable to believe birds will occupy a number of other inland impoundments as populations increase in size.

In addition to the amazing recovery from pesticide contamination, ospreys are proving themselves quite adaptable to human intrusion and disturbance. Although trees are the natural nesting sites of ospreys, more and more pairs have shifted to offshore struc-

tures as shoreline development has increased over the years. In 1985, over 90 percent of the ospreys here nested on offshore structures such as buoys, duck blinds and pilings. It seems possible that a tree nesting osprey may eventually become a rarity in the state!

Many people who have observed ospreys nesting on structures in front of their waterfront houses for years logically assume they are watching the same birds. Our studies have shown, however, that the annual overwinter loss of adults is about 18 percent, or about one of every five birds. This means that though a site may have lost its original nesting pair, the site itself attracts other birds, and will be continuously occupied year after year.

Top: An osprey clutch. Four eggs per nest only occur about 10 percent of the time. Normally the clutch will range from one to four eggs. Above: Five-day-old ospreys on a natural nest built on a channel marker. Ongoing studies color-band such ospreys for individual identification; photos by Mitchell Byrd.

It was good news to see the osprey returning and growing in numbers in Virginia. But in 1982, another osprey mystery confronted us. We began to see evidence of severe sibling aggression in nests. Many chicks were not developing feathers at a normal time nor at a normal rate. Moreover, many young were dying between the time of hatching and the time of fledging. This chick mortality has varied from 20 percent of the young to as high as 90 percent in the upper part of Chesapeake Bay.

In the summer of 1985, we tried to determine the cause of this brood reduction. Rates of delivery of food by adults to chicks were measured at a number of nests and compared with similar data from 1975. It was found that male ospreys were spending 35 percent more time hunting in 1985 and bringing back 35 percent less food by weight. Birds also appeared to be feeding on less desirable prey species, such as eels and toad fish.

Top: Osprey; photo by Bill Portlock. Above: Osprey nest on a pine snag; photo by Mitchell Byrd.

All of these data suggest that the Virginia osprey population is overcrowded. The population seems to have reached the point where the environment can no longer support an increase in population. Brood reduction may reflect food shortage as a result of environmental change, or perhaps, more direct competition with other ospreys for existing and limited food resources.

Between 1950 and 1973, the osprey proved to be a very sensitive indicator of environmental quality with respect to pesticides. The fact that young are starving may signal a different type of environmental degradation of which we are yet unaware. In any event, we cannot afford to become complacent about the status of a species which otherwise has rebounded so strongly from near extinction. There are more questions to be asked, more answers to be discovered—as there always will be when dealing with the complexity of the environment and the animals that inhabit it. □

Mitchell Byrd is a professor of biology at William & Mary. He also directs statewide research on peregrines, eagles and ospreys in Virginia.

Smaller is Better

when you're casting about for a net you can live with.

by Stephen C. Ausband

The first time I threw a cast net it was to gather bait for king mackerel fishing in North Carolina. I started with a big net. I had admired the way practiced salts could stand on the bow of a center-console fishing boat, squinting under a sun visor at the flickers of silver in the water that marked the menhaden schools. Then a windup like a discus thrower's, a dance-like gesture of springing legs, outstretched arms, and as much as 70 square feet of netting, complete with weights and a line, would balloon as gracefully as a skirt, sinking over four dozen "pogies," which would be dumped quickly into the live well.

"We got the baits," the net tosser would say nonchalantly. "Now let's go offshore and get the kings."

Well, I thought he was being nonchalant. Now I know he was being insolent. He was looking forward to watching me throw the net into the water in a shapeless wad, alarming every attentive menhaden within 500 yards.

"You threw a banana," the insolent one would say. There are people along every coastline in the world who delight in saying things like that. It keeps them entertained when they're not catching fish.

The cast nets used by true king mackeral maniacs are often nine, 10-or 11-footers. Last summer I watched a teenager throw a net nearly 14 feet in radius. He held sinkers in his teeth and draped hanks of net all over his body, and when he let the net go it spread out to cover an area larger than a pickup truck. In some parts of the Southeast, a man who can't handle a 10-foot net is treated as shiftless; you wouldn't mind drinking with him occasionally, perhaps, but you wouldn't trust him with your Mako 23. Now a 10-foot net is 20 feet in diameter, covers some 62 square feet, and weighs about as much as an auxilliary outboard—or at least it seems to when it is wrapped about one's arms and shoulders. Throwing this ungainly monstrosity is a lot like putting a frightened cat into a small sack: parts stick out everywhere in protest of the whole idea.

Small cast nets are valuable for catching minnows, menhaden, spot and other small bait fish; photo by Cindie Brunner.

I tried. I bought a long-billed sunvisor and learned to sling part of the net over my shoulder and keep the rest of it out of my shoelaces. I affected the squint of a confident expert. I managed to stay on board the boat every time I threw the net. A couple of times I even caught some menhaden. But it all seemed like a tremendous amount of trouble for bait fish, and I very nearly decided that my king mackerel could eat artificials or go hungry. Then I discovered what some children and most good flounder fishermen have always known: that you can have a awful lot of fun with much smaller nets, and you can catch things with them too.

A four-foot net is a joy to handle. Learning to throw the net effectively takes about five minutes. Learning to throw it expertly takes another 30. It makes a beautiful, eight-foot parachute and will gather enough minnows for a day of flounder fishing in just a few throws. And while it is inefficient as a gatherer of larger baitfish for toothy predators like kings, it certainly will catch mullet, menhaden, spot, and anything else you can throw it over. Since it is very light and maneuverable, you can throw it over an amazing variety of marine life, especially if you do your throwing from the deck of a small boat.

A six-footer is a little harder to throw, weighs quite a bit more, but covers about one-and-one-half times as much area as the four-footer (37.68 sq. ft. compared to 25.12). I do a little bet ter on mullet and menhaden with the six footer, much better on everything else with the four (and the four is fun to throw all day long). I owned a nine-footer for a while, but I traded it for the six because the six was easier to store, easier to throw, and (for me, an amateur) more productive and much more verstile.

A nine footer has a very open weave and sinks quickly; it was designed for catching a bait well full of pogies on every cast. If I lived within easy striking distance of salt-water gamefish I would surely have a big net now. But I live inland, and the time I spend on salt water is too valuable to be wasted untangling myself from a room full of nylon webbing. Mere practicality makes demands, and I know that any salt water enthusiast can benefit from a net as small as four feet. Here's why.

Big nets are, in the hands of capable net tossers, remarkably efficient catchers of bait fish, and a man who is anxious to point his expensive new battle wagon toward the blue water in search

Small four-foot to six-foot cast nets are light, maneuverable, and a joy to handle. Even children can master them easily; photo by Cindie Brunner.

of game fish wants to be as efficient as possible. He doesn't want to fiddle his time away with a net which doesn't cover enough area or which (because of small mesh size) sinks too slowly to catch fish in deep, clear water.

But, those of us who catch more flounder and trout and bluefish than kings or amberjack, will need a net which will take a bucketful of minnows and maybe a handful of small mullet. Veteran flounder fishermen have long used the small nets, as have inland striped bass fishermen looking for bait shad. Cast nets with a diameter of no more than eight feet are legal for gathering bait fish for personal use in inland waters in Virginia.

Sling the net a few times along a marshy shoreline and the profusion and variety of natural bait that turns up will surprise you. Crabs, minnows, finger mullet, and small spot come cascading out of the mesh and onto the deck or into the waiting bucket. Esoteric catches include flounder, the odd ray, and shrimp. I have caught early fall mullet in the four-foot net which were big enough to eat, but that is not the purpose of having it, nor is it a reliable way of getting big mullet. The primary reason for the little net is the gathering of small bait fish, and it does a remarkable job at that. It can be pressed into service for gathering larger stuff, while it is difficult to gather minnows in the shallows with a 10-foot net.

Another reason for having the small net around is pure entertainment. I enjoy seeing what "those funny looking little fish" swimming along a grassy channel look like up close. Sometimes I want to find out what made the silvery splashes just beyond the bow of the boat. What is the difference between the kinds of life I find in Wachapreague Channel and the kinds I find next to Parramore Island near the inlet? What kinds of tiny beasties come into the shallows of Chesapeake Bay after dark? My son kept himself busy one night last summer by netting some small sharks that had gathered around a fish-cleaning station. He was able to examine them, determine their species, and let them go unharmed.

A corollary advantage of this kind of entertainment, of course, is education. Children, who can learn how to throw a small net in a very short time, are invariably fascinated by what the net brings up. When the fish are not biting, a visit to a tidal pool is as good a way as any for a child to spend an hour. Most kids find it more challenging than a video game and more interesting than anything on television. "The right hand does all the work," you tell them. "Pick the net up by the ring and shake the kinks out. Make loops in the weighted line and lay them on three fingers. The left hand just spins the thrown net into a hoop."

They catch on quickly. I don't believe that a child who spends some of his formative years experimenting with a cast net will grow up to be a drainer of salt marshes.

A four-foot cast net will usually sell for around $25. Large nets are proportionately higher, except for some deluxe versions in the very largest sizes, which can be very costly.

They all wear well. I have had my four-footer for years, and although it shows some signs of wear from catching oyster shells and driftwood, it still performs well. I supose I have caught whole truck loads of marine life with it by now.

I have not given up on the idea of learning to throw an 11-foot net with grace and accuracy. I have not given up on the idea of winning a king mackerel tournament, either. But there are other things more pressing. I need to take my little boat to Quinby Inlet when the flounder begin to pave the bottom in the spring (I'll have to pick up some minnows on the way, of course). I want to catch a really big trout in the bay on a summer evening (I'll look for some small spot for bait). And I'll certainly have times when I am tired of waiting for the fish to bite or I am just curious to see what made a trail of ripples and splashes along a shoreline. A net is good for that. □

Stephen C. Ausband is an English professor in Danville, and is a frequent contributor to Virginia Wildlife.

A Madness For Oysters

by Curtis Badger

Chesapeake Bay oyster (Crassostrea virginica); *photo by Bill Jenkins.*

Humans have an insatiable appetite for the lowly oyster— always have, it seems. And our own Chesapeake Bay oyster beds have been praised, plundered, and propagated— all for the love of a shellfish that spends most of its life stuck to a rock.

Oysters, watch out. You're fair game now, even in June. The widely held belief that oysters should be eaten only during the "R" months September through April is a figment of the European imagination. In Butler's *Dyet Dry Dinner*, dated 1599, there is the admonition that "It is unseasonable and unwholesome in all months that have not an R in their name to eat oysters."

Oysters, however, can be eaten at any time of the year, but Butler's warning was probably heeded in this country because of the threat of spoilage during hot weather. Another likely reason for the avoidance of oysters in summer is because the common European oyster, *Ostrea edulis*, holds its larvae within its gills. Oysters eaten during this period would have an unpleasant gritty texture because of the tiny shells of the larvae.

But *our* oysters, *Crassostrea virginica* spawns by releasing eggs and sperm in the water, where fertilization occurs. Thus, no larvae, no shells in our tasty adult oysters.

It's hard to imagine a world without Chesapeake Bay oysters, but Europeans were enjoying the tasty shellfish as early as 100 B.C. Romans consumed oysters in prodigious quantities, and when the Europeans landed in this country, they discovered that the native Americans had long shared their taste for oysters, as the huge mounds of shells in middens adjacent to Indian villages attest.

Oysters were one of the staples of the Jamestown Colony, and from Colonial days until the mid-19th century, the supply of oysters in tidewater Virginia more than met the needs of local residents, and provided a surplus for shipment to distant markets.

As the population grew along the East Coast, however, exploitation of

valuable oysters beds increased. Oystermen, brokers, and consumers alike treated the resource as if it were a never-ending gift. Oysters were dredged both winter and summer, day in and day out, and delivered to shucking houses or taken to processing plants where their shells were ground into limestone with their meats still intact.

Such arrogant disregard for the resource, and such blatant waste, quickly led to depletion of the oyster beds. In the 1860s and 1870s hundreds of thousands of bushels of oysters were transported by schooner from the Chesapeake Bay to the exhausted northern beds, but by 1880 even the seemingly inexhaustible oyster resources of Virginia and Maryland were beginning to fail. It finally became clear to business and legislative leaders that if there were indeed to be an oyster industry in the future, some regulation and management would be necessary.

The most significant item of legislation governing the harvest of oysters in Virginia came in 1891 when Governor P.W. McKinney recommended that the state place a tax on tongs and dredges, that all natural oyster grounds be surveyed, and that properly surveyed grounds be leased with legal safeguards.

Lt. James B. Baylor of the U.S. Coast and Geodetic Survey, a native Virginian, was hired in 1894 to survey and chart all grounds in Virginia which were producing oysters naturally. Baylor's task was to determine which grounds were producing oysters naturally. These areas would be considered public grounds, open to any Virginia resident who purchased a state license. The state would then lease to private business areas outside the public grounds that were suitable for artifically raising oysters.

Baylor's assignment sounded uncomplicated enough—simply locate natural oyster beds, survey them, and mark their location on charts. Baylor quickly found, however, that the definition of "natural oyster bed" was based on political as well as biological considerations. State law required that three commissioners from each county assist in the survey to designate the natural beds in their jurisdiction. Baylor complained that the efforts of the county commissioners created an inconsistent survey because of disagreements regarding the definition of a natural oyster bed. Some local politicians were prejudiced against the survey, others were ignorant of what constitutes natural rock, and others likely had in mind the best interest of their oyster-broker constituents instead of the public at large.

The oyster beds of the Chesapeake Bay are open to both the public and private entrepreneurs alike. Top photo by Bill Portlock. Bottom photo by Carol Kushlak.

In turn, Baylor was criticized as a lackadaisical and inept surveyor who got the job out of courtesy because he was a native Virginian. And it was charged that many of the large scale maps he used pre-dated the Civil War, were badly outdated and inaccurate.

Nevertheless, Baylor persevered, and at the completion of the survey, some 210,000 acres were declared public oyster rock, available to anyone with a set of tongs and a valid license. To Baylor's credit, his survey still stands, with some revisions, nearly a century later. The theory was that potential grounds outside the survey would be leased to private enterprise, seeded with oysters from the public rocks, and by enlightened management practices and hard work, increase the total number of acres of productive oyster ground in Virginia.

The theory was sound, but it didn't exactly trigger a Gold Rush stampede of oyster-growers anxious to stake their claims to prime bottom. Although Virginia's oyster resource had diminished, it was still more profitable to sell oysters from the public rocks than to lease barren bottom and to transplant seed. By 1909, only 35,000 acres had been leased, and those numbers didn't jump dramatically until after World War II, when demand for planting ground increased. In the decade following the war, the number of acres leased to private enterprise doubled to 132,000 acres. Currently, about 110,000 acres are being leased, and the annual yield from private holdings now surpasses that taken from the traditionally more fertile public grounds.

The fact that the oyster survives at all is one of the more miraculous

accomplishments of nature. Next time you savor a fat, delicately flavored oyster, consider the formidable odds it had to overcome in its four years of life as it battled its way from microscopic larva to its current, temporary perch atop your tongue.

That the oyster was created at all is the result, literally, of a shot in the dark. The female oyster, your oyster's Mom, sends a tiny cloud of about 100 million unfertilized eggs adrift in the water sometime between mid-June through October. Nearby, a male oyster, your oyster's Dad, produces a similar puff of sperm. The currents are kind and the eggs are fertilized.

The resulting larval oysters have about three weeks to find a suitable, permanent base on which to strike, or they are doomed. For the first two weeks of their lives, the larval oysters are at the mercy of the currents, and most are swept far from where they were conceived. As the tiny, shelled larvae swim about, they are eaten up by small fish, shrimp, barnacles, crabs, and other animals that feed on the rich plankton soup of which your young oyster is part. At the end of the second week, should your oyster survive, it will settle to the bottom and seek a suitable spot for attachment. Its favorite habitats include pilings, cans, rubber tires, and other "structure," but it is shells, either those of living oysters or empty shells, that provide the most available sites.

The clock is ticking. If, at the end of its larval life, your oyster finds no suitable host, or if it drifts onto a bottom of mud, into shifting sand, or into a polluted or nutrient-poor area, it will die. It is a deadly game of musical chairs. And the oyster never knows when the music is going to stop.

But your oyster made it. It found a striking place, secreted a special glue which it spread carefully with its foot, then turned on its left side and cemented itself to its host. And there it stayed for four years, until some oysterman pried it loose.

That the oyster was conceived and found a home was an exception to the rule. It was a long shot. And the oyster was equally lucky to have survived to adulthood. Lying there on its left side, glued enduringly in permanent spatfall, it was preyed upon by any number of worms, snails, sponges, protozons, parasites, and fungi. And locked in its permanent, unmoving home, it was at the mercy of drought and flood, of shifting salinities, of human wastes, of leeching pesticides and choking siltation.

Think about that the next time you have a sweet, salty oyster poised on your tongue.

The fact that an oyster lives to provide your dinner is an aberration. Given the odds, it has no business reaching adulthood. That it does is no small miracle.

Lovers of oysters have for years sought to make this miracle of oyster-life less spectacular, more common. A French scientist in 1850 discovered that larval oysters would attach to shells, tiles or almost any clean object placed in the water near an oyster bed during the reproduction period. This discovery translated into the growing of seed oysters, which could profitably be transplanted and marketed. In 1874 Connecticut growers used this discovery by returning shells to the oyster beds to provide a surface on which the larvae could attach and grow.

Today, the growing of seed oysters and a shell repletion program are important conservation programs carried out by the Virginia Marine Resources Commission, the state organization charged with the responsibility of administering Virginia's public and private oyster grounds.

Scientists have also been studying oyster parasites and predators, seeking methods of controlling such devastating pests as the oyster drill, a small snail which bores through the oyster shell then feeds on the vulnerable animal inside. At the Virginia Institute of Marine Science (VIMS) at Gloucester Point, scientists believe they are close to developing a strain of oysters that is resistant to the deadly protozoan MSX, a single-celled animal that nearly wiped out Virginia's oyster resource in 1959, and has since spread along the East Coast.

MSX originally appeared in Mobjack Bay, and VIMS scientists believe that in those same waters they have found an oyster that is genetically resistant to the parasite. This resistant species will be brood stock for what scientists hope is a new generation of resistant oysters.

No other food item regularly consumed by Americans has gained such legend, such magical quality. And why the oyster? Why this homely, muddy, rough-hewn shellfish that most people see only at low tide or in the seafood market? Is it this secrecy, this quality of finding something so delicate and delicious hidden behind a facade so unendearing? Or perhaps it is that the oyster's very life is a miracle. That a living animal can confront and defeat such staggering odds indeed requires that deft hand of magic. And in all of nature, magic has never tasted quite so special. □

Going Oystering

If you want to go oystering in Virginia, contact your local Virginia Marine Resources Commission (VMRC) inspector. The number will be listed with the other state agencies in your phone book. Your VMRC inspector can tell you the location of public grounds and advise you of state and local laws that pertain to taking oysters in a given locality. If you can't find the name of the local inspector, call the VMRC headquarters in Newport News (804/247-2200) for assistance.

According to VMRC, laws vary from area to area, and regulations may be changed with little notice if it appears that the well-being of the resource is in danger. Hence the need to make the acquaintance of your local VMRC inspector.

Generally, the Virginia law allows individuals to take up to one bushel of oysters per day without a license. The oysters must be taken from public ground, in season (seasons vary according to area), and cull laws must be followed. You must also be sure that oysters are not taken from an area closed to shellfishing by the health department.

If you are more ambitious or hungry, a tonging license can be purchased for $10 per year which will allow you to take more than one bushel per day. Tongs cannot be used on Sunday in Virginia, and oysters cannot be taken by any means between sunset and sunrise.

Oysters have been eaten for several centuries in Virginia, which is to say that lawmakers have had over 200 years to draft a bewildering maze of shellfish laws. You might not have to have a law degree to go oystering, but you had better arm yourself with a thorough knowledge of state and local regulations. Be sure to contact your local VMRC inspector and get the facts, or do your oystering in your local seafood market. □

The piping plover, now an endangered species, depends on our Virginia coastline to nest and rear its young; photo by Bill Portlock.

Shy Birds & Sunbathers

It's a matter of sharing space on our coasts.

by Karen Terwilliger

Everyone seems to want that view of the ocean, the bay or the lake. The American Dream includes a house on the ocean front and a deck to kick back on while watching the sun melt down into the water every evening. But of course, there's a price tag on the American Dream, and the piping plover, a small, unobstrusive shorebird, is a paying member of that dream.

Once widely distributed throughout their range in the Great Lakes region and along the Atlantic Coast, this pale shorebird is one of the latest species to be added to the federal endangered and threatened species list. Why? Well, simply because we've been taking over its habitat. We love to set up house, picnic and sunbathe on the prime nesting habitat of the plover and other shore nesting birds.

Thus, across its range, this bird has declined rapidly over the last several decades. Not only have new homes replaced prime nesting habitat, but dogs and cats destroy nests; while raccoons, skunks and gulls, increasing in numbers along with human development, prey on plover eggs.

In Virginia, however, we have a rare situation. The undeveloped barrier islands of our Eastern Shore are one of the few areas where this endangered bird can still nest and raise young in a relatively undisturbed environment. The fragile dynamics of this island chain precludes practical development, and all of the islands are subject to federal, state and local restrictions.

Piping plover nest with young; photo by Jerry Via.

This type of situation not only provides nesting habitat for the piping plover, but countless other species of shorebirds who rely on undisturbed beaches to breed find Virginia's Eastern Shore a rare ticket to survival.

Each year, almost one-fourth of the entire U.S. Atlantic coast population of piping plovers return in late March from their southern wintering grounds to set up territories on high shelly beaches on the Eastern Shore, particularly on Assateague, Metomkin, and Cedar Islands. Studies have shown that these birds often return to the same location each year. Throughout April, plovers are interested in courting and defending their territories, and by May, have begun to incubate their eggs. Plover nests are almost impossible to find, yet are extremely susceptible to destruction if adults are forced to abandon them.

Both the male and female plover share in the nesting and rearing of young, and by June 1st hatching is usually complete, with the downy chicks following their parents to the safety of dune vegetation. By the end of June, the family can be seen feeding visibly on the beaches. By the 1st of July, most chicks have developed their flight feathers and fledge, but family groups can be observed feeding in the mudflats behind the dunes throughout the summer.

Although *most* of Virginia's barrier island chain is protected from development, some islands remain in private hands, and all islands are accessible by boat. This means that humans can inadvertently affect the reproductive success of shorebirds just by landing a boat and picnicking on the dunes of these fragile islands. Thus, the Commission of Game and Inland Fisheries, in charge of Virginia's conservation plan for the plover, has informed barrier island property owners of the status and nesting requirements of the piping plover, and signs have been put up warning beach visitors to respect the nesting rights and habitat of shorebirds in the area.

This is a wonderful opportunity for Virginians to show they care about our wildlife heritage and want to help us conserve it for future generations. And all it will take is a little respect and compromise at the beach this summer. It's a matter of sharing. What a small price to pay to keep Virginia one of the most productive breeding grounds for the piping plover along the Atlantic. □

Karen Terwilliger is a wildlife biologist with the Game Division in charge of non game research.

A Coastal Photo Essay

Where The Land Meets The Sea

by Christopher Pague

The tide was one of the lowest of the year, near the spring tide. Looking through my binoculars at the Atlantic beach of False Cape State Park, dark, spider-like shapes stood at the water line. A March heat wave distorted my view. As I approached the forms became clear. They were water-soaked tree stumps, some half buried, others perched on leg-like roots. Where a forest stood in the recent past, the ocean now battles with what seems a permanent sandy beach. Much of what Mother Nature tries to teach is cryptic, but here was a wonderful lesson clearly revealed to a youthful naturalist.

The coastline had changed.

To most coastal inhabitants living off the waters, the vagrancies of the coast are parts of their lives. Transfigurations can occur suddenly. The chattering of a child's laughter and the sea breezes of July 4th weekends have no place on the coast during a storm. Life can be destroyed, islands divided, channels filled and dunes levelled in a single blow. A shell-covered nesting area of least terns is destroyed in one place and formed in another by waves washing a beach and spreading long-buried broken shells on the land. Life on the beaches must be able to move as the sand does.

Other transitions of coastal habitats occur more slowly, often not evident within a single lifetime. Forests now claim the dunes at Cape Henry that were laid down, row by row, by the ocean. The Great Dune, sometimes peaking at more than 60 feet high, was described by botanists at the turn of the century as actively creeping landward, covering forests in its path. Whatever forces stilled the Great Dune's wandering is a mystery, but today the peaks are anchored by pines and struggling oaks. Climbing in one of these trees to view the forests in a way seen by few, I wonder on which row of dunes Capt. John Smith and the English sailors of 1607 clambered through beach grass and slipping sand to plant a British flag. Which dune face did the children of ancient tribesmen roll down as beach children do?

Wind and water can add and subtract sand dunes, create spits and inlets. But the geological past shows coastal metamorphosis that is barely imaginable. The Ice Age Indians emerging from the forests of Mathews County, walked down to a fast-flowing river full of smooth boulders and cobble. The great volume of water held in glaciers lowered sea levels at least 100 feet, draining the Chesapeake Bay. Only when the glaciers began to share their water again did all tidal portions of our coast as we know them form a little more than 15,000 years ago-only a spark in geological time.

Walking on a James River beach in early spring, thawing ice sets free a shell of fossilized bay bottom scallop. Traveling further west to the top of Paris Mountain in Montgomery County, rocks are filled with fossils of ancient beach dwellers. I leave it to the geologist to work out the hidden details.

The coast has been moulded and reshaped by sudden storms and slow-pulsed geological forces. Life that exists on the coast moves with that change. Only man claims a coastal ownership defined by stellar rules. □

Christopher Pague is a doctoral student in ecological sciences at Old Dominion University.

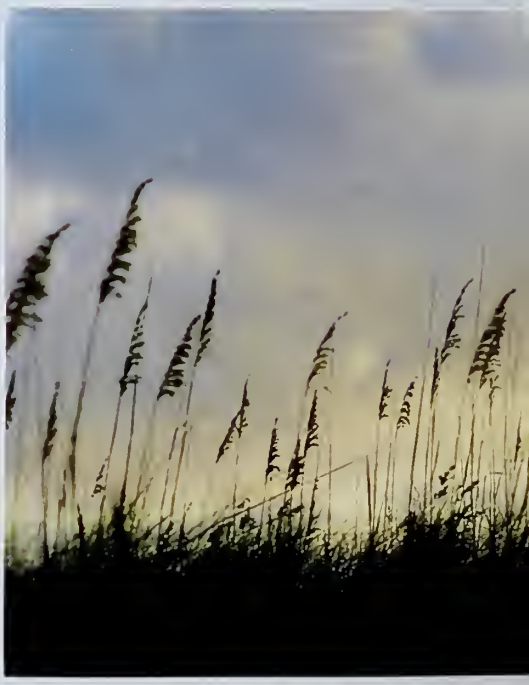
Laughing Gulls; photo by Bill Portlock.

Oystercatchers; photo by Bill Portlock

Atlantic coastline; photo by Sarah Bellmund.
Following pages (18-19), dunes;
photo by Bill Portlock.

Life on Virginia's barrier beaches can be harsh for bird life. Even carefully camouflaged feathers, nests, and eggs are no guarantee for survival. Yet for the hatchlings that survive to fledging, the beaches, ocean and marshes are generous—providing high energy resources. Laughing gulls scavenge on the beaches, while oystercatchers snatch up small invertebrates abundant in tidal mud flats. The system is dynamic, constantly changing and readjusting—always struggling towards equilibrium—in a place of half land and half water.

Crab traps; photo by Shirley Whitenack.



Sea oats; photo by Shirley Whitenack.

The water covers life that we only snatch glimpses of—in the glint of the bluefish tearing off with bait, or a blue crab ensnared in a net or caught up in a line. Animal egg cases thrown up on the sand merely hint to what lies below and out from the surface. And yet, it is so easy to be lulled by sqawking gulls overhead and a blue horizon marked only by an occasional flash of silver or white. It is so easy to forget what lies underneath the surface and lives.

Whelk egg case; photo by Page Chichester.

The Trail of the Sea Turtle

pulling the pieces together in Virginia

by J.A. Musick

More than 65 million years ago during the era Cretaceous, Tyrannosaurus rex, King of the Dinosaurs, was the ultimate predator. Great reptilian pterodactyls soared the skies, and birds still had teeth. Massive sea turtles, quite similar to those found today, swam the seas and hauled out on tropical beaches to lay their eggs. Then—asteroids on a collision course with earth smashed into our planet and a great cloud of dust and debris filled the atmosphere—a natural nuclear winter. Gone were the dinosaurs, gone the pterodactyls, gone much of the earth's existing fauna—*but the sea turtles survived.* They survived and flourished into the twentieth century.

Only today are these great beasts in trouble. They are on the verge of extinction because man has destroyed their nesting beaches, robbed their eggs, killed them for food, and inadvertently drowned them by the thousands in trawl nets. In the United States, all species of sea turtles are listed on the U.S. Fish and Wildlife Service Endangered Species List.

Since 1979, the Virginia Institute of Marine Science (VIMS) has been studying sea turtles in Virginia. Much of our research since 1982 has been funded by the Nongame Program, administered by the Commission of Game and Inland Fisheries. What is the money used for? Well, the Ches-

Each summer, the Chesapeake Bay becomes a giant nursery for great numbers of juvenile sea turtles that migrate to its safe and productive waters. Scientists are taking advantage of this rare opportunity to find our more about the biology, behavior, and range of these endangered species. Right: loggerhead sea turtle; photo by J.A. Musick.

apeake Bay just happens to be one big nursery for juvenile sea turtles, in fact one of the larger nurseries in the world. From hatching until reaching sexual maturity, sea turtles migrate to the Bay to feed and forage during the summer months before heading out to . . . well, no one really knows where in the winter. Thus, Virginia's waters hold answers to the mystery surrounding the ancient history of sea turtles—answers to even basic questions such as how old a turtle is, or the average life span of a sea turtle. If we can uncover those answers, it may bring us closer to understanding how to maintain healthy populations of sea turtles. And it may help us understand more about the mechanics of the marine environment that keeps them and us alive.

Sea turtles are basically sub-tropical or tropical animals and cannot survive the winter in Virginia. They first arrive off our coast from the south in late spring, usually in May as water temperatures rise into the upper 60's. The juvenile turtles enter the lower Chesapeake Bay in large numbers during the first two weeks of June, then disperse as far as the mouth of the Potomac River and even in small numbers up into Maryland's waters. The loggerhead sea turtle is by far the most abundant species found in Virginia; we estimate between 2,000-4,000 turtles swim into the lower Chesapeake Bay each summer. The Kemp's ridley turtle, which nests on the east coast of Mexico, is the second most abundant species, followed by the leatherback, and green turtle.

By following the geographic locations of stranded, dead turtles and by tracking live turtles with sonic and radio transmitters, we have learned that loggerheads and ridleys utilize different habitats while summering in Chesapeake Bay. Loggerheads establish home ranges at the edges of channels at the mouths of the major rivers like the York and Rappahannock. There they move back and forth with the tide and forage on horseshoe crabs. Ridley turtles, the other hand, prefer shallower habitats like Mobjack Bay where they spend their time hunting for blue crabs that they find in grass beds.

Although the two species have been confused by some people, they are easy to tell apart in our area. Loggerheads have a mahogany-colored upper shell with yellow limbs and underparts and are usually represented by large (greater than 100-pound) individuals.

Green sea turtle; photo by Sarah Bellmund.

Leatherback sea turtle; photo by Sarah Bellmund.

Kemp's ridley sea turtle; photo by Sarah Bellmund.

Ridleys are usually small (less than 30 pounds), and have a greyish upper shell with pristine white limbs and ventral region. Some readers may be surprised that a 100-pound loggerhead is considered to be a juvenile, but this species does not mature (the tell-tale sign of maturity is a tail) until it reaches about 200 pounds. Even larger, the black rubbery-looking leatherback sea turtle doesn't mature until it attains a weight of about 700 pounds.

By following sea turtles in the lower Bay by small boat, and monitoring their behavior with a hydrophone and a radio receiver, Richard Byles, a Ph.D. student who has spent hundreds of hours tracking these turtles, discovered that loggerheads spend most of their time hunting or sleeping underwater. Only about five percent of the time do they swim on the surface.

Sea turtles remain in the Chesapeake Bay throughout the summer growing fat on the abundant food there and avoiding predation from tiger sharks which are their principal predator. Tiger sharks, although common offshore in summer, do not usually enter Chesapeake Bay, probably because of the lower salinity there.

When the first cold northeast winds strike the Bay in late September or early October, and water temperatures drop, the sea turtles migrate from the Bay down the coast toward Cape Hatteras. The turtles round the Cape sometime in late November or early December, depending on how fast water temperatures drop. We have followed turtles to Hatteras by placing small radio transmitters on their shells, then tracking them by small boat and single engine airplane. But in years past we have always lost track of them after they moved south of Hatteras because they moved so far offshore—well beyond the safe range of our small airplane.

We suspected that some of our turtles spent the winter on the continental shelf in warm water at the edge of the Gulf Stream, as far south as Florida, because we recovered a loggerhead in the Chesapeake Bay that had been tagged the winter before off Cape Canaveral.

In the fall of 1985, we were determined to find out where Chesapeake turtles spend the winter. Since conventional aerial radio tracking failed, we spent three years developing a more powerful transmitter that could be monitored by a satellite circling the

Earth. We tagged two turtles with these devices.

The first turtle was released off Cape Henry in early October. We tracked it down the coast for 20 days, when Hurricane Juan hit with strong southeasterly winds. The turtle unexpectedly moved into Pamlico Sound south of Roanoke Island. Then the turtle's diving patterns changed abruptly and the transmitter broadcast constantly as if it were bobbing free on the surface. We deployed our aircraft to Pamlico Sound and found that virtually the entire northern North Carolina shrimp fleet was concentrated in Pamlico Sound south of Roanoke Island.

We suspect that our turtle was accidentally trapped and drowned in a shrimp trawl, and that when the fishermen discovered the dead animal, they removed and discarded the transmitter overboard because of fear of prosecution by Fish and Wildlife Service agents. Regardless of the premature termination of that experiment, it provided us with the longest continuous set of tracking data we had ever been able to collect from a turtle in the open ocean.

We released the second satellite-tagged turtle off Oregon Inlet in mid-November. We chose this site because our aerial turtle surveys indicated that this was the area where the main body of migrating loggerheads was then located. This second satellite-tagged turtle was luckier than the first. It moved with the rest of the turtles south of Cape Hatteras in early December. Then it proceeded south, close to shore to Cape Lookout where, following the shoals, it moved to the east. Up to then its movements were exactly as we had suspected. Then something occurred that surprised us (research is most interesting when the animal's actions don't fit your preconceived notions). The turtle entered the western edge of the Gulf Stream and was swept to the northeast over deep water (deeper than 6,000 ft) off of Chincoteague.

Then, the turtle became entrained in an eddy of the Gulf Stream that had broken off the western edge and drifted south, surrounded by cooler water, toward Hatteras. As of March 1985, the last position we have for the turtle is about 100 miles due east of False Cape. Only time will tell what this turtle will do as spring progresses. The batteries in our transmitter should last for nine months, so we hope to continue to receive additional information through August. We plan more satellite tracking experiments this year to follow Virginia sea turtles as they leave Chesapeake Bay.

Cooperating veterinarian Robert George performed bone biopsies on three live loggerhead turtles in a study to determine age in sea turtles; photo by J.A. Musick.

Anyone finding a dead or tagged sea turtle should contact VIMS at 804/642-7000, the Game Commission at 804/257-1000, or the U.S. Fish and Wildlife Service. Tag numbers should be recorded. Your information is vital.

Sarah Bellmund, a graduate student at VIMS, draws blood from a loggerhead turtle for a health anaylsis with the assistance of a local waterman, Fred Jett; photo by R. Klinger.

When we began our work seven years ago, no one knew much of anything about the growth rates of juvenile loggerheads. Such information is vital for management, since we need to know how long it takes for a species to reach maturity to figure out the population's reproductive potential. So, using the antibiotic oxytetracycline (O.T.C.), which becomes incorporated into growing bone and stains it much as tetracycline stains the teeth of young children, we injected over a hundred live loggerheads supplied to us by cooperating watermen in the Chesapeake Bay.

In addition, each summer we salvage and dissect around 100 dead sea turtle carcasses which wash up or strand on Virginia's beaches.

Ruth Ellen Klinger, a graduate student at VIMS, removed the humerus (upper arm bone) from stranded specimens. She then took thin cross sections of the bone and stained them with special histological stains. When placed under the microscope she could see rings on the bone sections, like the rings on a tree. She found that the number of rings could be correlated quite closely with the length of the turtle. Thus they could be used to describe growth and estimate age—if we knew how many rings were formed each year.

Here entered the O.T.C. By injecting and releasing turtles we hoped to recover some after they had been in the wild for a year or so.

In 1985, four OTC marked turtles were recovered. Dr. Robert George, a local veterinarian, performed bone biopsies on three live turtles, two which weighed over 170 pounds. We are on our way to finding out whether this bone marking procedure will work to age turtles—and the preliminary analyses do look promising. But there is still much more to understand.

Man, whose ancestors, were tiny shrew-like scavengers snatching dinosaur crumbs at a time when sea turtles were already a successful, thriving group, has pushed them to the brink of extinction. It is his responsibility to pull them back from it if he can. And perhaps then he will appreciate his link with a prehistoric past and do his best to preserve it. □

J.A. Musick is a professor of marine science at the Virginia Institute of Marine Science.

illustration by John Snyder

Fishin' Advice

(The Kind You Can't Find In Books)

by Jack Randolph

I thought he was taking me on a snipe hunt. Who ever heard of catching eels by using thread instead of a fish hook?

"Bobbing for eels," he called it.

"All ya' gotta do," said the old man, "is run a thread through a yard or two of worms, ball 'em up and tie them to your line. Lower the mess to the bottom and when you feel an eel grab it, just lift it up. The thread'll be tangled in the eel's teeth and he can't let go."

Although I had heard of eel bobbing for years, I never had the urge to give it serious thought until one summer a few years ago I decided to give it a go. I bought a few dozen nightcrawlers at the general store, and bringing them home, I proceeded to thread them, stem to stern, on a long length of cotton thread. I wound up with a string of nightcrawlers about six feet long.

According to long remembered instructions, I wound the string into a ball about the size of a softball and tied it to a line on a cane pole. So armed I took off for a dock on Ward's Creek, a tributary of the James River in Prince George County.

Eels bite best after dark, and this was a night-time operation. My son, John, came along as a witness as I dropped the ball of worms off the dock and waited pessimistically for something to happen. It didn't take long. In less than a minute something started to gnaw on the worms. With a steady lifting motion I raised the gob onto the dock and, sure enough, along came an eel, its teeth firmly imbedded in the threads. The eel was so well entangled I had trouble shaking it off into a basket.

The bob worked like a charm. Later I took it off the cane pole and tied it with a spinning outfit. It worked just as well. When an eel made off with the gob I simply reeled it in, lifted it up and deposited it into the waiting basket.

What did I do with the eels? Well, they are darned good eating and nothing beats them smoked. This particular batch was destined to be cobia bait, but smaller ones are super baits for striped bass or largemouth bass. I bet most largemouth that hit plastic worms think they are dining on eels. Thin sections of eel on a catfish hook are prime baits for cats. They are probably the best trotline catfish bait going.

Catching your own minnows is another thing that has gone out of style. One would think that the price of a dozen minnows these days would nudge a few more folks back into the catching business, but perhaps it's a matter of havin' the time.

But it's different for us. We never were much for those little stream minnows. Oh, they're pretty enough, but they won't live long in a minnow bucket. We like to catch those shiner or roach minnows in ponds, or better yet, in tidal creeks (It's probably smart to point out right here and now that the Game Commission takes a dim view of catching them in Commission-owned lakes. In fact, it's a good way to get a ticket). Minnow traps will catch the critters, but they are not nearly as much fun as a four or five foot square umbrella net. Tie the net to the end of a stout pole about eight feet long, leaving about three feet of line between the pole and the net.

Lower the net into about three feet of water, either from shore or a dock. Put an open can of a fish base cat food in the middle of the net before you put it in the water. After the net has been in the water for a couple of minutes, look carefully to see if any minnows are attracted to the cat food. If you can't see any, soak a couple of pieces of white bread in the water and then ball them up in your hand, squeezing out as much water as you can.

From the ball of soaked bread, pick out pieces of bread, rolling them into balls about the size of BB shot and toss them into the water a few feet outside of the net. As minnows begin to take the bread, toss the bread closer and closer and finally into the net. When you think you have duped enough of the little critters, lift up the net and you're in business.

If you are a true sportsman, take a bit of light line on long pole and tie a tiny size 20 hook to it. Bait with the BB size bread balls and you can catch plenty of minnows. They won't pull hard or jump, but even these little guys are fun to catch. In fact, a few tiny hooks in the tackle box can make your day when you need live bait and have none.

Now, let me tell you about the gentle art of getting a skunk out of a trap without getting—you know. On second thought, I never have won an encounter with a skunk, so you had better look elsewhere for that bit of advice. □

Jack Randolph is assistant director of the Game Commission and an avid fisherman.

Chesapeake Cunning And Chicken Necks:

The essentials of the great blue crab hunt.

The blue crab (Callinectes sapidus); photo by Bill Portlock

by Curtis Badger

To Melissa Swain, there is nothing subtle about it. Nothing cute or crafty. It's strictly a matter of timing. Speed against speed. Power against power.

At 11-years-old, Melissa is at the perfect age to develop her skills in the fine art of crabbing. She is at the age when blue jeans are outgrown before they lose their store-stiffness. She stalks the shallows in a slow, deliberate gait, head down, watching for the dark blur of movement at the margins of the marsh grass.

She crabs the way the heron fishes. Her strides are long and slow, every movement accounted for, nothing wasteful or superfluous. And she strikes in the same manner. The net for long moments is unmoving, then suddenly it hits the water in an explosion of action. And just as quickly it is retrieved and held high, a captive blue crab tangling

itself in the nylon netting. Melissa grins in victory and flips the crab into her plastic bucket.

Like Melissa, most crabbers depend on speed at first, and when they become seasoned veterans (at, let's say, age 13), they learn finesse. They learn how to keep the net underwater and quietly surprise the crab from behind. Or how to keep the net still and use their foot to herd the crab toward it. Such wisdom and cunning are the products of age and experience, and Melissa will develop these qualities in another summer or so.

Just as there are Type A and B personalities, so too are there Type A and B crabbers. Melissa is a definite Type A. Crabbing is an aggressive business to her. Her senses are sharp; she stalks her prey with athletic skill. The Type A crabber could win fame and fortune as a tournament bass angler.

The Type B crabber is characteristically older and less mobile. Their standard hardware includes a chicken neck, a string, a dock, something comfortable to it on, and a cooler filled with thick sandwiches and cold drinks.

This crabber is laid back. His is a quiet, contemplative sport that requires patience, skill, deft presentation of the bait, and an almost scientific knowledge of the feeding habits of the prey. While netting crabs is kinetic and charged with energy, chicken-necking is a cerebral sport. First, there is the consideration of bait. Any part of the chicken can be used, but the neck is far and above the most popular. The chicken neck has done for crabbing what the plastic worm has done for bass fishing. The neck is inexpensive, effective, and readily available. You can probably get all you need for free if you go around to all the houses in your neighborhood and ask people to save their chicken necks for you. The neck is also good because it has those little grooves in it, and they help keep it from slipping out of the knot.

The skill in chicken-necking is being able to detect the subtle nudging of the crab, and knowing when to lift the bait and crab to the surface. Most crabs are lost because the crabber becomes excited or impatient and lifts the crab too quickly. It can take a long time to gain the keen sense of touch required, and you will lose many crabs before you learn the subtle nuances of an

The Blue Crab Glossary

If you're going to be a crabber, you'll have to learn the language. No other fish or shellfish in Virginia has given rise to such a colorful and wide-ranging vocabulary as the blue crab. Crabs have been caught and eaten for centuries, and over the years the watermen who catch and sell crabs have coined terms to describe practically every stage of crab development. So here is a sampling, by no means complete, of the language of the blue crab.

Apron - The abdomen of the crab, folded under the body

Ballie - A female carrying an egg mass; a sponge crab

Buck and Rider - A pair of mating crabs; a doubler

Buckram crab - A crab with a leathery shell, following the soft crab condition

Busted sook - Sponge crab

Buster - A shedding crab beginning to emerge from its old shell

Chandler or channeler - Large male crab

Doubler - See buck and rider

Green crab - White-rim crab; expected to shed in about two weeks

Hard crab - Any crab having a hard shell

Jimmy crab - A large male

Nicking - Breaking the movable claw to prevent the crab from biting

Orange crab - Sponge crab

Papershell crab - Having a hard shell that is easily cracked; following the buckram stage

Peeler - Hard crab with a fully formed soft shell beneath the outer shell; expected to shed in a few days.

Pink-rim - Following the white-rim condition and preceding red-rim, will shed within a week

Rank peeler - Red sign crab; almost a buster

Red-sign peeler - A thin red line appears on swim fins, will shed in two days

Sally - Young female crab

Snot crab - A white-rim crab, will shed in two weeks

Soft crab - A crab which has just emerged from its old shell

Sook - An adult female crab

Sponge crab - A female carrying eggs; there are many terms to describe this condition

Water gall - A papershell crab, very light in color and weight; also known as white crab and windjammer

effective retrieve. But hang in there; the rewards are well worth the effort.

Obviously, there are more than two ways to catch a crab. I have not mentioned the various mechanical traps, trotlines, and pots, because these methods lead us away from pure amateurism and into the camp of the professionals, whose standards are governed by the dynamics of the marketplace rather than by a consideration of the principles of sport. Of course, if your second cousin and his family are flying in from Des Moines, and they last tasted Chesapeake Bay blue crabs 17 years ago, you might want to lower your principles and heighten your catch—at least just this once.

Most sporting goods stores and tackle shops in Virginia's coastal areas carry a small, folding metal trap that works fairly well—although on a good day Melissa could outcrab one with her net.

If you want to go the big-time, professional crabber route, invest in a wire pot. This is the same trap used by watermen all over Chesapeake country and on the seaside Eastern Shore. You've probably seen their colorful marker floats when you were fishing, or you might have seen them stacked along the waterfront in coastal towns during the off season. You can buy these crab pots from the same folks who supply the commercial watermen; ask around in any crabbing town for the name of the nearest distributor.

On the Eastern Shore, the Mental Retardation Services System manufactures crab pots through its Vocational Center in Belle Haven. Prices range from $8 for a basic crab pot to $16 for a deluxe rig complete with rope, float, metal frame, and a zinc bar that retards electrolysis.

If you play with professional equipment, you're going to have to play by professional rules. The Virginia Marine Resources Commission, our official guardian of the vital blue crab resource, allows one crab pot per person for recreational use. More than one pot and the VMRC requires a license, which costs $29 per year per individual.

You must also abide by Virginia's size and catch limits. Recreational crabbers without licenses are allowed a bushel of crabs a day, whether you catch them in a net or crab pot. Male crabs and immature females must be 5 inches wide (measured at the widest

Netting crabs requires finesse and high energy—most young crab stalkers have both; photo by Curtis Badger.

Picking crabs by hand is fast becoming a lost art; photo by Rod Coggin.

point). There is no size limit on peelers, soft crabs, and adult females.

The Chesapeake Bay blue crab *(Callinectes sapidus)* is principally an East Coast species. It is common from Massachusetts to the Gulf Coast, and a few have been reported as far north as Nova Scotia. But to understand the importance of the Chesapeake Bay to the crab (and vice versa), consider that approximately two-thirds of the entire blue crab harvest in the United States is taken in the Chesapeake. Current production, say VMRC officials, is approximately 50 million pounds annually, with a market value of more than $12 million. These numbers do not include the significant recreational catch or crabs caught in Virginia waters and sold in other states.

The economic effect the blue crab has on coastal Virginia is apparent, but it is probably unrecognized by many of the recreational crabbers who stalk the shallows with a net, or fish from docks with chickens necks. For generations, the crabs have been showing up in the spring and hanging around until cold weather. They are fun to catch and even more enjoyable to eat, so what else is there to know? There is something about the blue crab that stimulates the curiosity. The more crabbing you do, the more you want to know about these mysterious creatures.

Summer is the crab's mating season in the Chesapeake, beginning in early May and continuing until October, reaching a peak in late August and early September. Male and female blue crabs are easily recognized by the shape of the abdomen, or apron. The males's apron is T-shaped and slender. The females is rounded in the adult stage and triangular in the juvenile.

Young female crabs are called sallies, while adult females are referred to as sooks, a derivative of the word sow. Males are known as Jimmies, Jimmydicks, or chandlers. Males reach sexual maturity before they are fully grown, but females mate only after they have shed for the last time. The female usually is in the soft-shell state during mating, and she is carried by the male in a cradle-like fashion to protect her.

Eggs are laid two to nine months after mating. If mating occurs as early as May, eggs may be laid in August. If the crabs mate in late summer, egg laying will be delayed until spring.

A female crab carrying eggs underneath her apron; photo by Curtis Badger.

Crab eggs—up close. Females will carry from 700,000 to 2 million eggs each; photo by Curtis Badger.

The eggs when first laid are bright orange, and are carried in a large mass under the crab's apron. Such crabs are called sponge crabs, orange crabs, or cushion crabs. The eggs will hatch in about two weeks, and will change color to a dark brown as they mature. The number of eggs in a sponge ranges from 700,000 to more than 2 million, but many do not hatch, and still fewer will live to become adults. Scientists estimate that only one-ten-thousandth-of-one-percent of the eggs will survive to become mature crabs.

After hatching, the crab grows by shedding its hard outer shell. Small crabs shed frequently—even the smallest every three to five days—and the largest crabs every 20 to 50 days.

As the crab prepares to shed, a new, soft shell forms beneath the old one and is visible in several places along the outer shell, principally along the edges of the swimmerets. Just inside the edge of these paddles a thin line of color can be seen. At the earliest stages, from one to two weeks before the shed, the rim is white. When it turns pink, the crab will shed in three to six days, and when the rim is red the crab will shed in less than three days. Red-sign crabs are called peelers and are a popular bait with bay fishermen.

After the crabs shed, the new shell will remain soft or leathery for about three days. It is at this stage just after the molt that crabs are marketed as soft crabs. They are delicious at this stage and are eaten shell and all. The eyes and viscera are discarded, then the crabs are lightly seasoned, dusted with flour, and fried in butter.

Of all Virginia's edible fish and shellfish, perhaps none is quite so versatile as the blue crab. Crabs can be fried, steamed, made into crabcakes, used in soups, caseroles, and omelets, or eaten cold in salads.

But the traditional method of preparing crabs is still the favorite of most folks who live along the bay. First you spend the afternoon gathering crabs by whatever method best suits your personality. As soon as a sufficient number has been collected, dump the crabs into a steamer pot and dust them liberally with your favorite seafood seasoning. You can either concoct your own seasoning mixture, or you can buy a commercial product such as Old Bay. When the shells turn red, the crabs are ready to eat.

Like Melissa's approach to crabbing, the method is not fancy, but the results speak for themselves.□

Curtis Badger is director of publications for the Wildfowl Art Museum of the Ward Foundation in Maryland, and is a frequent contributor to Virginia Wildlife.

June Journal

Book Review

by Jeffrey M. Curtis

From Laurel Hill to Siler's Bog
by John K. Terres
Algonquin Books of Chapel Hill, N.C.
$12.95 semi-hardcover (permabook)

Few writer-naturalists have the ability to express on paper what they've seen in the wild. Their efforts either end up sounding like a technical research paper, an emotional dictum or a lot of anthropomorphic rabble. When a book or story from a naturalist is done well, nothing could present more enjoyable reading. And so it is with *From Laurel Hill To Siler's Bog* by John K. Terres. This is a good book.

Terres is the author of seven books, all related to nature. He has written articles for several national magazines and presently holds the position of roving editor for *National Wildlife.*

His efforts in compiling *Laurel Hill* have earned him the esteemed John Burroughs Medal for Distinguished Nature Writing in 1971. The book was originally released in print in 1969 by Alfred A. Knopf, but remained out of print for 16 years and almost impossible to find. Until now.

Algonquin Books purchased the manuscript, included illustrations by artist Charles L. Ripper, and rereleased a handsome, readable edition.

The stories, which include titles of "Story of an Old Farm," "How a Vulture Finds Its Prey," and "The Black Gobbler of Willow Oak Swamp" all arise out of Terres' stay on the 600-acre Mason Farm in Chapel Hill, North Carolina. The farm is a remnant of the original estate first settled by Mark Morgan before the American Revolution and presently controlled under the direction of the University of North Carolina. Terres went to the farm as an observer, but with the intent of producing what finally became "*Laurel Hill.*"

I'll tell you why I liked the book: First off, Terres became familiar with his animal subjects. He had to have spent many hundreds of hours motionless in a blind day after day to have seen the things recorded in the book. He doesn't analyze or interpret what he saw, but accurately repeats it for the reader. And he does it with a kind of detached kinship with the animals that a naturalist must have to convey his observations properly.

Terres encounters hunters in his studies, especially in "The Black Gobbler" story. It was interesting to read how he handled that situation. To Terres's credit, he felt no animosity towards the hunters, realizing that they too are part of the plan.

He also knows how to end a story. In fact, his conclusions were so appropriate in a couple stories I had to reread the final chapters for the pleasure of his conclusions.

Here's someting from "The Raccoons of Morgan Creek:"

"I followed the trail, walking slowly and looking sharply at the big tree ahead. Then, on one of the uppermost branches that slanted outward toward the blue January sky, I saw the large raccoon. He was sprawled flat, his front and hind feet dangling over the sides of the branch. His eyes were closed and his chin was resting on the bark. An in that moment I saw two smaller raccoons lower in the giant tree. Each was in a separate crotch: each was coiled with its face buried between its forepaws. All three were asleep in the warm sunshine, oblivious to their world.

A warmth swept over me at the innocence of these sleeping animals; then dread, at their vulnerability. I might have been their enemy instead of being their friend. Completely disarmed, they were risking their lives for this moment of ease. Yet they were wild and free, and this must be freedom's way for them—taking the small comfort between terror and pain before the last sweet darkness and silence without end."

From Laurel Hill to Siler's Bog might be a bit cutesy here and there. Overlook it and keep reading. The accounts and the style more than make up for it. I don't think that I've ever read a better piece on a male turkey's courtship display than in this book. And never have I seen such good reporting on flying squirrels. I hope you'll enjoy this book as much as I have. □

National Fishing Week
June 2-8, 1986

OOPS!

We goofed. In the April issue of *Virginia Wildlife,* we erroneously stated that "keeper" size for *landlocked stripers* is 15 inches. The *correct* minimum size for taking landlocked stripers is 20 inches. Hybrid stripers, however, can be taken at 15 inches. Check your fishing regulations summary booklet for more information, or call the Game Commission at 804/257-1000.

June in the Wild

What's happening in the wilds of Virginia in June?

- White-tailed fawns are born
- Wild turkeys hatch
- Bluefin tuna appear off Virginia Beach
- Muskrat kits are born
- Freshwater turtle nesting peaks
- Summer rains bring out pinewoods treefrogs and narrow-mouthed toads *(Hyla femoralis* and *Gastrophryne carolinensis)*
- Red-backed salamanders, slimy salamanders, and the Peak's of Otter salamanders *(Plethodon cinereus, Plethodon glutinosus,* and *Plethodon hubrichti)* lay eggs in early June
- Spotted salamanders and Jefferson's salamanders *(Ambystoma maculatum* and *Ambystoma jeffersonianum)* transform from larvae to juveniles

Volunteers Needed

The Chesapeake Bay Foundation (CBF) needs volunteers with sharp eyes who will be spending their free time this summer and fall on the water. In order to verify U.S. Fish and Wildlife Service aerial photographs identifying submerged aquatic vegetation (SAV) beds, the public is urged to report findings of underwater grasses near their homes, marinas, and recreational areas. This underwater vegetation is extremely important for foraging and cover for such species as blue crab, sea turtles, and waterfowl. In addition, the leaves and roots of the vegetation bind sediments and baffle currents to stabalize the bottom and prevent erosion.

The hunt is on to find these underwater grass beds to help determine the ecological health of the Bay. Since the 1970's, SAV's have suffered a serious decline in abundance paralleling the degradation of the Bay, and CBF is hoping that the location of recovering grass beds may provide clear signs of environmental improvement.

Your participation can be as simple as marking the location of grasses on a map anytime between May and October. To obtain a map and grass identification book, write: CBF, SAV-Hunt '86, 162 Prince George Street, Annapolis, MD 21401. □

Bird of the Month

The Snowy Egret

Perhaps no other North American bird can claim such a dramatic history as can the snowy egret. It is a story of a delicately graceful species brought to the brink of extinction, rescued at the last minute and finally restored to its former abundance.

The first ornithologists to take note of the snowy found it in abundance along the Atlantic Coast and in the swampy bottomlands of the south. Alexander Wilson, in the early 1800's, described a large nesting colony near Cape May, New Jersey. And Audubon, writing in 1840, found them in large numbers in the Carolinas, along the Mississippi and on the Gulf Coast.

By the turn of the century, however, there was left but a pitiful remnant of this population. Nearly all had been slaughtered for the feather trade. The fashions of the "gay nineties" had created a tremendous demand for the "aigrettes," the long, curving plumes which adorn the birds at nesting time. They were used to decorate ladies' hats, and the plume hunters sought the birds at breeding time when they gathered in close, communal flocks. They shot the birds as they came to feed the young, ripped off the plumes, then left the carcasses to rot. The hapless nestlings gradually starved to death.

It was a grisly spectacle, a sad period in our history. When bird biographer Arthur C. Bent visited South Florida in 1903, he found but a few pairs of snowies in a remote mangrove swamp in what is now the Everglades National Park. The remaining birds sought refuge deep in the most inacessible swamps.

Farther north, the egrets were completely extirpated from their former haunts. May Thatcher Cooke, in her "Birds of the Washington, D.C. Region" (1929) listed the snowy egret as "accidental," with but one recorded specimen. As the birds became more scarce, the price for their plumes escalated, inciting the hunter to search them out in the most remote swamplands. Once the nesting site was discovered, it was a simple matter to wipe out the whole colony.

It was through the efforts of the Audubon Society that the first laws protecting the birds were passed. In 1910, the New York legislature voted for a bill prohibiting the sale of feathers of any native bird. But the millinery trade claimed the birds came from South America, and the law was poorly enforced. Gradually public awareness pressured state legislators, and finally there were federal restrictions.

Given protection and the chance to nest in safety, the egrets increased steadily. Bent found them common once more on the coastal islands of Texas in 1923. And at about the same time a private sanctuary in Louisiana boasted of 2,000 pairs. The egrets were also breeding at several Audubon sanctuaries in Florida.

Throughout the thirties and forties, they gradually reclaimed territory to the north, and today, the snowy is one of the most numerous of the herons. Except where its habitat has been destroyed, it seems to be spreading its range even farther to the north than previously recorded.

In Virginia, this egret is a common sight in Tidewater from May through October. They are much less frequent inland. The breeding colonies are mainly on the Eastern Shore peninsula on both the bay shore and Atlantic barrier islands. These coastal heronies, usually consisting of several species, are situated in low shrubby vegetation, or "merkle," adjacent to broad stretches of salt marsh. Sometimes the low cedars that grow on the hummocks or "tumps" are utilized.

The nests are but flimsy platforms, so thin that the eggs, a pale, glaucous green, can be seen from below. After an incubation period of about 18 days, the fuzzy white hatchlings appear. They grow rapidly, and in three weeks the youngsters leave the nest. They stay nearby, though, and return to the security of the nest for the first week or so.

In juvenile plumage, the youngsters show none of the plumes that grace their parents. Not until the first spring do these develop, and even then they are but rudimentary. The following summer the pre-nuptial molt produces, in full perfection, the long, curving "aigrettes."

All of these lovely sprays of white are lost during the summer molt, which climaxes in September. They are replaced by the much straighter and shorter feathers of the winter plumage.

At all seasons, the snowies are readily recognized: pure white, with a black bill, black legs and yellow feet. (The brightly colored feet are believed to attract fish as the birds wad through water.) On immature birds, the backs of the legs are yellow as well.

The yellow spot between the eye and bill is another good field mark. It helps separate the egrets from the young of the little blue heron, which is also mostly white and about the same size. The bill of the little blue is a light, grayish-blue.

Had the snowy egret not been saved from the depredation of the plume trade, we would have lost a creature of rare and delicate beauty. That it is still with us is a tribute to the conservation efforts of the past and a stimulus to continued vigilance. □

by John W. Taylor

June 1-7, 1986
Boating Safety Week